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ABSTRACT

This manual contains a work sample intended to assess a handicapped student's interest in and to screen interested students into a training program in basic machine shop I. (The course is based on the entry level of the drill press operator.) Section 1 describes the assessment, correlates the work performed and worker traits required for completing the work sample. and lists related occupations and DOT codes. Instructions to the evaluator are provided in the next section. The conditions and administration equipment are detailed, and the set-up and breakdown procedures are illustrated. The section on administration provides a student orientation including student material with an explanation and illustration of equipment and/or procedures. Instructions for task procedures actions to be taken, as well as post sample interview topics are also covered. Section 4 explains the method of scoring and provides forms. Section 5 lists technical data (norms, reliability, validity) to be included in a supplement to this manual. Contents of the section on maintenance and construction include information on tool and equipment maintenance, a materials list (equipment, source, price), and assembly instructions. Section 7 cites references. An appendix defines terms. (YLB)

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DRILL PRESS

Work Sample

CE037627

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I. INTRODUCTION

A. Assessment Description

The Drill Press Work Sample is intended to assess a student's interest in and screen interested students into a training program in Basic Machine Shop I. This course is 36 weeks in length and is based upon the entry level of the Drill Press Operator, Production Job (DOT 606.685-026). The job of Drill Press Operator, Production, falls within the Boring Occupations. Occupational Group Arrangement and Elemental Work, Industrial Worker Trait Group (06.04).

It should be kept in mind that following are the various activities and worker traits that are associated with a Drill Press Operator, Production. Most of these activities and worker traits would also be required of a student working in a Basic Machine Shop I Course, only with less demands. Also, it should be understood that many of the worker trait values would be higher for the Drill Press Operator, Production, than the student in the Basic Machine Shop I Course.

The work performed and Worker Traits required for completing the Drill Press Work Sample are as follows:

WORK PERFORMED	WORKER TRAITS REQUIRED	
1. Sets up drill press	GED	2
	SVP	1
	APT	G-4, V-4, N-4, S-4, P-4, Q-5, K-4, F-3, M-3, E-5, C-5
	WA	1, 3, 9
	WS	10
	PD	S, 4, 6
	WC	I, 5
2. Starts/stops drill press	GED	1
	SVP	1
	APT	G-4, V-4, N-4, S-4, P-4, Q-5, K-4, F-3, M-4, E-5, C-5
	WA	1, 9
	WS	S, 10
	PD	L, 4, 6
	WC	I, 5
3. Drill holes in workpiece	GED	2
	SVP	1
	APT	G-4, V-4, N-4, S-4, P-4, Q-5, K-4, F-3, M-3, E-5, C-5
	WA	1, 3, 9, 10
	WS	2, 10
	PD	L, 4, 6
	WC	I, 5
4, Removes workpiece	GED	1
	SVP	1
	APT	G-4, V-4, N-4, S-4, P-4, Q-5, K-4, F-3, M-3, E-3, C-5
	WA	1, 3, 9, 10
	WS	2
	PD	L, 4, 6
	WS	I, 5

B. Related Occupations

Drill Press Work Sample

DOT description:

DRILL PRESS OPERATION, PRODUCTION (606.685-026)

Related Occupations	DOT Code
MACHINE SHOP APPRENTICE	600.280-026
MACHINIST APPRENTICE, AUTOMOTIVE	600.280-030

II. INSTRUCTIONS TO THE EVALUATOR

A. Work Sample Conditions

The Drill Press Work Sample is to be administered indoors with no noise constraints from neighboring areas such as in the Industrial Arts areas. Good overhead lighting is helpful but not required. The work sample involves light work, and must be performed by a person with both hands or one who has equivalent manual and finger dexterity from a chair or wheelchair. This work sample was designed to allow the evaluator to be able to determine whether the student has the necessary skills to pass a Basic Machine Shop I course in a high school successfully. The work sample can be hazardous and requires the student to have no loose clothing on, shirt sleeves must be rolled up or secured, no ties should be worn and safety glasses must be worn while in the shop area. All health and safety precautions should be adhered to regarding Occupational Safety and Health Act requirements as well as those safety factors which may be encountered in local industry and unique job requirements.

B. Administration Equipment

The following equipment is required prior to administration:

Evaluator Equipment:

- Stopwatch
- Manual for the Drill Press Work Sample
- Task Observation Sheet

Student Equipment:

- Drill Press and 3/8" drill (electric)
- 5/16" diam. drill bit (or similar)
- Table or similar (36" high)
- Work Pieces (1" X 4" X 4" wood)
- Drill press chuck key
- Safety glasses
- Rubber stamp with concentric circles (1/8, 1/4, 5/16, 7/16, 5/8) with stamp pad.

C. Setup and Breakdown

The correct setup and breakdown procedures for the Drill Press Work Sample are as follows:

The evaluator first sets up the drill press so that it is in alignment with the work bed. The student should only have to make minor adjustments in aligning the drill bit and work bed when he begins working on the work sample. The student stands in front of the drill press so that it is comfortable for the student to work on the work sample. The evaluator stamps with rubber stamp four concentric circle patterns.

The work pieces, 5/16" diam. drill bit and drill press chuck key are placed on the table for ease of usage by the student.

An illustration of correct setup of the Drill Press Work Sample is shown in Figure I. While giving instructions and pointing out work sample parts, the evaluator stands to the right of the student so as not to obstruct the student's view of the work sample. No alterations are required for wheelchair persons except adjusting the heights of the drill press or utilizing a platform so that the student will be at the correct height in relations with the drill press.

When the work sample is completed, the evaluator inspects and scores the work done by the student. The work sample is broken down by removing the work peice, raising the drill press chuck and drill bit, removing the drill bit and placing them in their respective places. All shavings must be swept clean of the drill press and floor.

Timing Procedures:

This work sample is timed from the moment the student signifies understands the instructions and indicates that he is ready to begin and until he drills the last hole and indicates that he is finished.

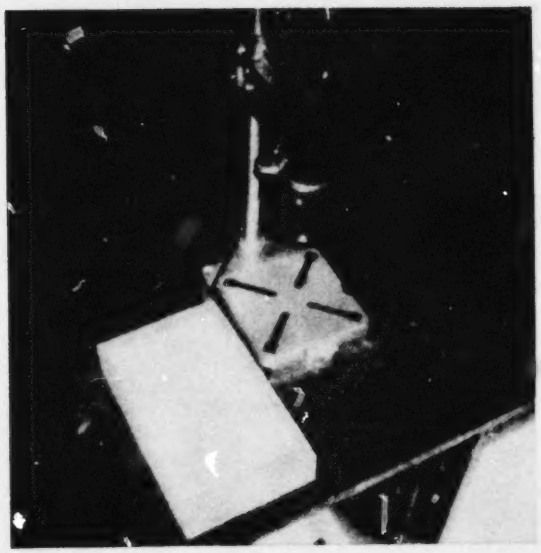

FIGURE 1

Quality Checks:

Quality is checked by the evaluator through visual discrimination to assure:

- that the drill bit is properly secured in the drill press chuck.
- that the work bed is properly aligned.
- that the work piece is held properly.
- that the student observes proper safety precautions when operating the drill press.

III. ADMINISTRATION

A. Student Orientation

Read or paraphrase the following information to the student:

> The work sample that you are going to do is called the Drill Press Work Sample.
>
> The work you will be doing on this work sample is similar to the work that students do in the various high schools. It is also similar to the type of work that drill press operators do in industry.
>
> On this work sample, you will carefully look over and inspect work piece. You will hold the work piece and turn the handle when the motor is on. Turning the handle lowers the drill chuck and bit. When it lowers to the work piece, you apply more pressure and drill through the work piece. (The evaluator should demonstrate this). Now, try it yourself.
>
> Your job on this work sample will be to hold the work piece and drill a 5/16" dia. hole through it, making sure that you drill the holes as exact to the center as possible. Please read all instructions carefully before starting to work.
>
> I will show you how to do the work in a minute, but first, do you have any questions?

B. Instructions and Demonstrations

Sighted Population

STATEMENT	ACTION
Your job is to drill a 5/16" dia. hole through the 1" x 4" x 4" piece of wood. Please put on the safety glasses.	Point to the piece of wood and safety glasses.
Place the 5/16" dia. drill bit in the drill press chuck. Secure the drill bit by turning the chuck key until the chuck jaws are tight.	Demonstrate this by showing the student how the chuck key is used. At least 5/8 of the drill bit must extend out of the drill press chuck.
Lower the drill press chuck by turning the handle. Turn the Handle until you can determine where the drill bit matches the holes. Make adjustments in work bed if necessary.	Demonstrate this.
Hold the work piece in your hand. Check the alignment of the drill bit and work piece again to make sure that you will drill the hole in the work piece correctly.	Demonstrate this.
Turn the drill press on by pressing the button. Care should be taken to observe all safety rules.	Demonstrate this.
Lower the drill chuck by turning the handle until the drill bit comes in contact with the work piece. Proceed by applying pressure on the handle until you have drilled through the work piece.	Demonstrate this.
When you have completely drilled the hole through the work piece 4 times, raise the drill chuck to its up position and then turn off the drill press by pushing the off button.	Demonstrate this.
When the drill press stops turning completely, you may take out the work piece and place it on the table.	Point to the work piece and table.
Your job will be to drill a 5/16" dia. hole 4 times. When you finish, inform the evaluator.	Point to the work piece.
Do you understand the instructions? Go ahead and begin.	

Please return all of the equipment to their proper boxes and containers with the covers put in place.

Please wipe all equipment clean.

If the student showed an interest and a potential for the work that he did in the Drill Press Work Sample, a discussion of the Machine Shop curriculum should follow.

Post Sample Interview Topics

1. Did you like or dislike drilling with the drill press?
2. What do you think of drilling now that you have completed the work sample?
3. What did you like least (or most) about the Drill Press Work Sample?
4. Did you experience any difficulty in this work sample?
5. Do you need more information about the Basic Machine Shop I Course?

If you take the Basic Machine Shop I course offered next year and you pass the course, machine shop apprentices are hired in several firms located in this general vicinity. All are within a short drive from here and many are within walking distance from here. A Machine Shop Apprentice can start anywhere from minimum wage to $4.25 per hour, depending upon how well you do in the Basic Machine Shop I Course. Experience is also gained while employed as a Machine Shop Apprentice which could assist you in being promoted.

IV. SCORING

A. Explanations

1. Method of scoring:

Productivity will be measured and assessed by comparing total time spent in completing all parts of the work sample. This total time will be compared with those times indicative of students with similar special needs. Quality will be assessed by the total number of errors made. An error will be assessed by the student's failure to complete any task successfully that he is asked to do, such as:

- Improperly position the drill bit in the drill press chuck.
- Improper usage of drill press handle
- Improper method of holding work sample
- Incorrect centering of work piece so that drilled holes will be drilled in centers
- Improper observance of safety rules and regulations

2. Work Performance factors to be observed:

- Student able to follow verbal instructions accurately (or)
- Student able to read and interpret instructions
- Student able to manipulate drill bit, drill press chuck key, work sample, and drill press handle.
- Student able to perform tasks required properly.

B. Forms

Task Observation Record

School _____

DRILL PRESS WORK SAMPLE

Task Observation Record

Critical Errors (3 points each)

_____1. Secured drill bit improperly.

_____2. Did not align drill bit with work piece.

_____3. Did not observe all safety rules and regulations.

_____4. Improperly held work piece.

_____5. Did not carefully turn on/off drill press.

Observational explanations for 1 - 7.

Task Quality Errors

_____1. Was not able to sufficienty tighten drill press chuck with drill press chuck key.

_____2. Did not clean up properly.

_____3. Improperly manipulated arm

_____4. Incorrectly removed drill bit

_____5. Errors in circle centering

_____6. Errors in centering beyond one concentric circle

_____7. Did not follow drill hole pattern

Observational explanations for 1 - 7

Put additional comments and observations below.

_____ Critical errors

_____ Task quality errors

_____ Min _____ Sec Total time

_____ Date taken

_____ Evaluator

_____ Student

V. TECHNICAL DATA

A supplement to this manual is being developed at the time of this printing. It will include:

1. Norms
2. Reliability, test-retest studies
3. Validity
   a. Content validity - established through the Course Analysis based on methods suggested by U. S. Dept. of Labor Job Analysis techniques.
   b. Predictive Validity
      To be established through follow-up studies of students previously tested.

VI. MAINTENANCE AND CONSTRUCTION

A. Maintenance

After each administration:

- Evaluator should see that all materials and equipment are returned to their proper places.

B. Material List

Equipment	Source	Price
Drill press and drill	Sears	$55.00
5/16" dia. drill bit	Sears	3.00
Safety glasses	Sears	3.50
Table (36" high)		
Drill press chuck key	Sears	1.00
4 - 4" X 4" X 1" wood pieces		2.00
Stamp pad		1.70
Rubber stamp with concentric circles (1/8, 1/4, 5/16, 7/16, 5/8)	local printer	15.00

All of the above equipment and materials can be obtained from the various Industrial Arts shops.

C. Assembly Instructions

Prior to the student starting his Drill Press Work Sample, the evaluator must set up the drill press as shown in Figure 1.

1. Make sure that drill press is aligned with the work bed.
2. Attach hole template in work piece or stamps on wood work piece concentric circles.
3. Stack up the work pieces on the table.

VII. REFERENCES

Korn, T. (ed.) A Work Sample Style Manual. Interface No. 10. Menomonic, WI.: Research and Training Center, University of Wisconsin - Stout, 1976.

United States Department of Labor, Dictionary of Occupational Titles, 3rd Edition. Washington, D. C.: United States Government Printing Office, 1965.

Handbook for Analyzing Jobs, Washington, D. C.: United States Government Printing Office, 1972.

Occupational Outlook Handbook, 1970-71 Edition. Washington, D. C.: United States Government Printing Office, 1970.

APPENDIX

Definition of Terms

GED - *Is the general level of learning and reasoning acquired through schools, experience and self study. There are six GED difficulty levels, ranging from (6) the most difficult to (1) the simplest.*

SVP - *Is the special vocational preparation and training in terms of the total time required to prepare for an occupation. It ranges from SVP 1, short demonstrations only, to SVP 9, over ten years.*

APT - *Refers to aptitudes, which is the quickness and ease with which you can learn to do something. Aptitude definitions are included on a separate page in this manual.*

WA - *Work Activities:*

1. *Dealing with things and objects.*
2. *Involving business contacts.*
3. *Of a routine, definite, organized nature.*
4. *Involving direct personal contact to help or instruct others.*
5. *Resulting in recognition or appreciation from others.*
6. *Involving the communication of ideas and information.*
7. *Of a scientific and technical nature.*
8. *Involving creative thing.*
9. *Involving processes, methods or machines.*
10. *Involving working on or producing things.*

WS - *Work situations are the conditions under which the work involved in any occupation takes place. There are ten types described and they have been related to the 66 Worker Trait Groups in the Guide for Occupational Exploration. They are:*

1. *Performing duties which change frequently.*
2. *Performing duties of a routine nature.*
3. *Planning and directing an entire activity.*
4. *Dealing with people.*
5. *Influencing peoples opinions, attitudes, and judgements.*
6. *Working under pressure.*
7. *Making decisions using personal judgement.*
8. *Making decisions using standards that can be measured or checked.*
9. *Interpreting and expressing feelings, ideas, or facts.*
10. *Working within precise limits or standards.*

PD - Physical Demands are the physical requirements of an occupation and are described in six areas as follows:

1. Lifting, carrying, pushing and/or pulling.
2. Climbing and/or balancing.
3. Stooping, kneeling, crouching, and/or crawling.
4. Reaching, handling, fingering, and/or feeling.
5. Talking and/or hearing.
6. Seeing.

WC - Working Conditions are the physical surroundings of a worker in a job. The DOL lists six different types as follows:

1. Inside or outside.
2. Extremes of cold plus temperature changes.
3. Extremes of heat plus temperature changes.
4. Wet and humid.
5. Noise and vibrations.
6. Hazards.

Aptitudes are rated on a scale of 1 - Highest to 5 - Lowest as follows:

1 - Top 10% of the population
2 - Top third not including the top 10%
3 - Middle third of the population
4 - Lowest third not including lowest 10%
5 - Lowest 10%

The following are the definitions of the aptitudes:

G - General Learning Ability - The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgements. Closely related to doing well in school.

V - Verbal Aptitude - The ability to understand meaning of words, and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meaning of whole sentences and paragraphs.

N - Numerical Aptitude - Ability to perform arithmetic operations quickly and accurately.

S - Spatial Aptitude - Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

P - Form Perception - Ability to perceive pertinent detail in objects or in pictorial or graphic materials. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Q - Clerical Perception - Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content.

K - Motor Coordination - Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly.

F - Finger Dexterity - Ability to move the fingers, and manipulate small objects with the fingers, rapidly and accurately.

M - Manual Dexterity - Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions.

MR - Mechanical Reasoning - The ability to understand mechanical principles (pulleys, gears, etc)

E - Eye-Hand-Foot Coordination - Moving the hands and feet together in response to visual signals or observations.

C - Color Discrimination - Seeing likenesses or differences in colors or shades. Identifying or matching certain colors. Selecting colors which go well together.